Switchable Current Source

026

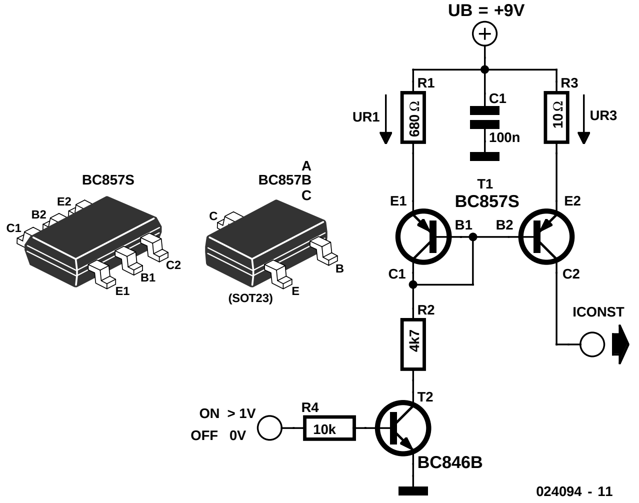
The circuit diagram shows a simple current source constructed from discrete components, which can deliver a constant current into a load connected to ground. The circuit can be switched on and off using transistor T2.

Optimum temperature compensation can be achieved by using a BC857S dual PNP transistor with the left-hand half connected as a diode. The current delivered can be determined via the following calculation: when T2 is turned on, the voltage across potential divider R1/R2 is the supply voltage minus the voltage dropped across the pn-junction in the left-hand half of T1, which we shall assume is 0.7 V. The current through the voltage divider is thus

$$I = (U_b - 0.7\ V) / (R1 + R2)$$

We can use this to work out the voltage across R1, which, because the bases of the transistors comprising T1 are connected, is precisely the same as the voltage across R3. For stable operation this voltage should be at least 1 V.

The current delivered can be adjusted by changing R3: the BC857S will not pass more than about 100 mA. The dual transistor contains two BC857s, a surface-mount version of the well-known BC557. The current source can of course be constructed from these 'normal' devices, although the temperature compensation will not be as good.



(024094-1)